A Multimedia-Based Automated Testing Environment

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Introduction

In this session, we demonstrate an automated testing environment that provides for on-line test administration and test taking. The environment is implemented as a Microsoft Access 97 application in a client-server configuration that utilizes Object Linking and Embedding to incorporate multimedia into the test items, which are stored as Word 97 documents. While originally developed to support training and evaluation requirements for a major Department of Defense operational facility, the capabilities are also applicable to a wide range of academic settings. Both the test administration and test taking components reside as client programs on personal computers that access a common, server-resident backend database of the tests, test items, and results via a local area network. Future plans include using the new capabilities of Office 2000 to migrate the test taking functions to a web-based format for increased flexibility and broader applicability.

Test Administration

The password-protected test administration functions include test item maintenance, test building, results monitoring, and performance analysis. Test item maintenance includes the ability to create and modify test items as Microsoft Word 97 documents with all of the associated object embedding capabilities. Test building is organized on the concept of a master test from which specific tests for individual test takers are created. These specific tests can be tailor-built for individual test takers with password-protected access or made available for general access. In either mode, the specific tests can retain the original ordering of test items or be given a random reordering. Results monitoring allows the test administrator to recall test results of any pending, taken, or posted test. Current performance analysis tools are based on individual test items and provide difficulty and discriminator indices.

Test Taking

The test taking component of the environment includes the ability to take formal tests for a grade as well as to generate practice tests and drills via a simple query form. When taking a formal test, the program provides flexibility in responding to or skipping test items with the ability to easily return to unanswered items. Upon completion of a formal test, the program validates that all items have been answered and allows the test-taker to return to test items that may have been overlooked. Formal tests are graded immediately upon completion and the test-taker is provided an option to review any test items they missed. This review process provides the test-taker with both their chosen and the correct answer together with a reference and some feedback text. Practice testing is facilitated via a simple query form that is used to retrieve selected test items via a variety of reference criteria. A randomization process is applied to the order of test items returned by the query. In the practice-testing mode of operation, the test-taker is provided immediate feedback upon response to each test item. The test-taker may exit a practice test at any time and will then be provided a summary of results for that session.

Conclusion

Assessment of both student learning and the performance of assessment metrics (test items) can readily be supported by applications based on currently available technology. Furthermore, this technology facilitates the incorporation of multimedia into these assessment tools. The prototype multimedia-based automated testing environment discussed here and demonstrated at the conference illustrates how this can be done and extends the capabilities to include a robust drill/practice test mechanism to augment the learning process. Future plans for the prototype include a web-based test taking interface and enhanced analysis of test item performance.